

REMARKS

Claims 1 through 16 and 18 through 21 are in the application and are presented for consideration. By this amendment, Applicant has made changes to independent claims 1 and 18 to highlight important features of the invention. New dependant claim 19 has been added to highlight further features. Additionally, independent claim 20 has been added. New claim 20 is similar to claim 18 but is presented in a different form. Claim 21 presents subject matter similar to the subject matter of claims 2 through 5.

Claim 4 has been objected to based on a typographical error (spelling). Applicant has not been able to locate the error noted. However, Applicant wishes to thank the Examiner for the careful reading the claims and for the helpful comments.

Claims 1 through 16 and 18 have been rejected under 35 U.S.C. 103 as being obvious based on the teachings of Haczynski et al (US 5,866,874) in view of Tsutsumi (EP 1358973). Applicant respectfully requests reconsideration of these rejections in view of the revised claims. The invention provides a combination of features which is neither taught nor suggested by the prior art. It is Applicant's position that the claimed combination of features is not obvious in view of the prior art.

Haczynski et al. discloses a conventional welding torch device. This welding torch is to be gripped by a robot in an also conventional manner. For mounting of the torch 10 at the hand side of a robotic arm a mounting arm 136 is provided (See Fig. 5). The robot hand is at one end and the welding torch 10 is mounted at the other end of the mounting arm 136 . The mounting arm 136 itself is not provided with an own rotation axis. Consequently the welding

torch 10 is not provided with any means which could make it possible to rotate one part of the welding torch 10 in relation to another part of the welding torch 10. As such, Haczynski et al. fails to suggest essential concepts of the invention and directs the person of ordinary skill in the art away from the invention. Because all parts of the welding torch 10 are rotationally fixed to each other, the rear housing 18 and the power cable are stressed as the welding torch 10 is rotated about an axis. The axis is not aligned or coaxial with the axis of the rear housing 18 and the robotic mount 16. Rotations with large rotation angles, particularly with more than 360° , are not possible, because such rotations lead to a twisting of the power cable and also of welding wires in case that a welding method is applied which needs a welding wire which is fed to the welding point. Haczynski et al. does disclose a welding torch with a rotor, which is able to execute rotary motions in relation to the stator. Haczynski et al. Is the problem which the invention overcomes but provides no indication that the problem is considered or even recognized. This is significant with regard to an investigation of obviousness as the recognition of the source of a problem or not present an indication of the obviousness of addressing the problem.

Tsutsumi's device concerns a rotary joint for electric signals and electric power. Tsutsumi's device is provided with an outer stator 1, which is fixed in a non-rotational manner to the arm of a welding robot. A rotor 6, which is mounted to a welding gun side (hand side) of the robot is rotatably coupled and supported to the stator, namely inside of the stator. It is not clearly disclosed as to what structure and how a driven rotary motion is transferred to the rotor 6. In connection with background art it is mentioned that a rotor can be mounted to a

hand side of the robot, it is therefore believed that the rotary motion is transferred by means of the flange 8, which is part of the rotor and should be attached to the robot. An upper opening of a shaft 7 of the rotor 6 which defines a passage of the rotor is closed by flange 8. It is therefore not possible to feed supply material which is needed for the welding process as well as electric power from the flange of the robot arm. Flange 8 makes it impossible for the device taught by Tsutsumi to be provided with a centrically leadthrough for supply material. As can be seen particularly in Fig. 1 of Tsutsumi, the electric power is led at the radial circumference and at a lower end of the outer fixed stator into the rotary joint. The electric power is then led in essentially radial direction to the rotatable rotor, which is arranged inside of the stator.

The present invention provides a structural arrangement which presents significant advantages. The structure and the related advantages differ completely from the cited prior art. According to the present invention the welding torch device is divided into a stator and a rotor, whereas the rotor is rotatably arranged with respect to the stator. The rotor as well as the stator is provided with interfaces for fastening the device at the robot and for fastening a welding torch to the welding torch device. Further the welding torch device is provided with an electrical current transfer device in order to transfer current through the welding torch device and to transfer the current between the stator and the rotor. The present invention differs as to these features from Haczynski et al and these features do not appear to be considered in the office action analysis as to these features in claim 1.

An important feature of the present invention is that the stator is - with respect to the

rotary axis of the rotor – provided with an essentially centrically leadthrough for leading supply material to the welding point. The claims highlight this important feature in combination with the other claimed features. As specified in claim 1 by means of the leadthrough of the present invention the supply material is guided at least to the receiving device. The receiving device is according to the definition of claim 1 the part of the welding torch device at which a welding torch can be attached in order to transfer driven rotatory motion to the welding torch. Tsutsumi only discloses a rotary joint with a rotor having a shaft 7 which should not be interpreted as leadthrough. There is no suggestion of the technical features of the present invention, in which the stator is provided with a leadthrough having a longitudinal axis essentially in alignment with the rotary axis and which is arranged inside of the rotor and the outer rotor rotates about the inner stator. These features are clearly highlighted in the claims as now presented.

Further, according to the present invention the introduction of the supply material into the welding torch device is executed by means of a centrically (with respect to the rotary axis of the robot and of the rotor) leadthrough 14 which is also with its opening (for introduction) centrically(coaxial) arranged in the welding torch device and which has a recess 15 with a longitudinal axis which is in alignment with rotational axis 8 of the connection flange. This subject matter has been highlighted in new claim 19.

In considering the teachings Tsutsumi, it is believed that the recess 7 of Tsutsumi's rotor of the rotary joint has no possibility to receive any material, because the recess 7 is closed by means of the upper flange 8 and it seems that flange 8 is obligatory in order to attach the rotor to the robot or to any other means which can provide the rotor with a driven rotational

movement. According to Fig. 1 of Tsutsumi, shaft 7 is completely closed with respect to its wall, so that also no lateral feeding of supply material into the central recess of shaft 7 is possible. However, the only recesses which are mentioned are three non-central wholes 17 for water. The water is not needed for the welding process and is probably only used for cooling purposes. Therefore, even the non-coaxial holes 7 are not leadthroughs according to claim 1 of the present application. Since the rotor 6 rotates about its central axis which is aligned in the middle of shaft 7, contrary to the leadthrough according to the invention the holes 7 of the rotor 6 rotate also about this axis and it is not possible to feed supply material in a nonrotatory manner to the welding torch.

Therefore even with any combination of Haczynski et al. with Tsutsumi it is not possible to receive a welding torch device having an inner stator which is surrounded by an outer rotor, whereas the outer rotor is provided with means for attaching the welding torch device to a robot and for transferring a driven rotational motion to the rotor and whereas the stator is provided with a central recess as leadthrough for supply material for the welding process. The present invention has the decisive advantage that although it is possible to let the rotor rotate around an axis of rotation which is in alignment with axis of rotation of the robot it is also possible to not transmit the rotational motion to the inner part of the welding torch device through which the rotational axis of this motion runs, namely the stator. According to its definition, the stator has no part which rotates, therefore also the central recess of the stator has no rotating wall. This makes it possible to lead supply material in a secure manner, with only a small technical effort and without any danger to damage to it as a result of a rotator

motion through the welding torch device and to feed it to the welding torch. Tsutsumi and any combination of Tsutsumi with other prior art do not offer such a possibility due to Tsutsumi's central arrangement of the rotor. The prior art as a whole does not provide any direction or motivation for the person of ordinary skill in the art to provide the combination as claimed. The prior art lacks teachings which would render the claimed combination obvious.

A further decisive advantage according to the invention, is provided by the electrical connection which is also arranged at the inner stator. As mentioned in paragraph [0032] of the present application, the upper end of the centrally arranged leadthrough 14 of the inner stator is also provided with an electrical connection for fixing an electric cable with which the welding torch device can be provided with welding current. These features are highlighted in claim 3. As a result of arranging the non-rotating stator inside of the rotor a compact design of a welding torch device is possible with no disturbing arrangement of an electric cable at a side of the welding torch device. Further, a drilling of the cable as a result of a rotary motion of the connecting flange 6 of welding robot can be avoided as well as a complicated current feed in radial direction as it is necessary by Tsutsumi although the welding torch can be rotated with any desired angle, particularly with angles greater than 360.

Besides the fact that the references do not teach or suggest the combination of features claimed and actually direct the person of ordinary skill in the art away from the invention, the rejection as stated in the Office Action is based on the combination of two prior art solutions without considering that the combination does not have a technical purpose. Haczynski et al concerns a welding torch device which does not have a stator and does not have a rotor.

Haczynski et al concerns only a common stiff welding torch device which has to be turned in its entity if a rotation of the welding torch is required. Only this makes it possible to connect the welding cable in a coaxial manner to the welding torch device. However, the solution of Haczynski et al has the big disadvantage that the welding cable is twisted as a result of the rotation which limits the angle of rotation. If a person skilled in the art wants to solve this problem the entire solution of Tsutsumi is available there would be no need to adopt any feature of the Haczynski device. Haczynski et al. contains no technical detail which could lead to an advantageous amendment of Tsutsumi. With respect to the technical development Haczynski et al is a step backwards in terms of teachers advantages and in comparison with the teachings of the features and advantages of Tsutsumi. A person skilled in the art would therefore not combine Tsutsumi with Haczynski et al.. Further, as can be seen in Tsutsumi, as soon as a welding torch device is provided with a rotor and a stator it was in prior art necessary to connect the welding cable at a side of the welding torch device. Tsutsumi explicitly teaches also that the shaft 7 has to be closed by means of the flange 8 and the shaft 7 is not used for anything else. Contrary to the statement in the Office Action, Tsutsumi's stator has no electrical connection for the welding cable 25 through which the rotational axis of the connection device of the robot runs. As can be seen in Fig. 1 and is described in para [0032] of Tsutsumi, the connection of the welding cable 25 is executed with collector bolt 24 whereas the rotation axis of the connection device runs in vertical direction through shaft 7 without coming near to and particularly coming not in contact with the cable 25 or the collector bolt 24. If a person skilled in the art tries to combine the teachings of the two cited documents

and to include Tsutsumi's rotary joint into Haczynski's welding torch device, the only possibility for that is to use Tsutsumi's solution for connecting the welding cable. Since the only reason for Tsutsumi's solution with an outer stator and a inner rotor is to provide a current feed from a side of the rotary joint in radial direction to the inner rotor, any other current feed is not compatible with Tsutsumi's solution. There would be no purpose to provide such an additional current feed. Any other current feed would make another design of the rotary joint necessary, which is not disclosed by Tsutsumi.

It is particularly unclear, how the coaxial current feed of Haczynski et al could be integrated into the Tsutsumi's concrete disclosed rotor/stator, particularly to the closed inner rotor through which the rotary axis runs. It is Applicant's position that this is not possible with the disclosed structure. The proposed modification results in a hypothetical device which would not work. Accordingly, it is Applicant's position that the combination of Haczynski et al with Tsutsumi is not possible or is not in any event meaningful.

The combination of features present a patentable combination. The rejection does not present a *prima facie* case of obviousness not render the claimed invention obvious.

Applicant notes that secondary considerations as to obviousness include *inter alia* the invention's commercial success, long felt but unresolved needs, the failure of others, skepticism by experts, praise by others, teaching away by others, recognition of a problem, copying of the invention by competitors, and other relevant factors. Applicant has noted above that the rejection is based on prior art which substantially teaches away from the claimed combination. Applicant has also noted that the prior art fails to recognize the problem which is addressed

by the invention. The secondary considerations are significant with regard to the analysis of obviousness based on the level of skill of the prior art and the teachings of the prior art. Applicant wishes to further point out that the claimed combination of features has received praise (of others) in the form of the “Success award” of the “Investitions- und Strukturbank Rheinland-Pfalz” (ISB Bank). This bank is owned by the German Federal State Rheinland-Pfalz. The bank is used by Rheinland-Pfalz in order to advance innovative technical developments. The award is given for successful innovative products and it was found that the product according to the features as claimed (the “POWER JOINT” product) offers decisive advantages with respect to other products on the market. In connection with the award it was mentioned that the POWER JOINT product (with the features of the invention as claimed) offers, for the first time, the possibility that the welding cable can be arranged in alignment with the rotary axis of the robot which makes an unlimited rotation of the welding torch and further allows for faster movements of the robot. The welding torch is not subjected to torsional loads. In comparison to other solutions the invention leads to a higher equipment availability. The award provides an indication that skilled persons judge the combination of features according to the invention as a pacemaking development. A link to information about the award is as follows: <http://www.sks-welding.de/e/aktuell/isp.html>.

It is requested that these secondary considerations be considered in determining the non-obviousness of the present application. It is believed that the invention presents a nonobvious combination and therefore is patentable. Several secondary considerations support Applicant’s position that the subject matter is not obvious. Further, the references employed

in the rejection fail to teach and fails to suggest the combination of features as claimed.

Accordingly, reconsideration of the rejection is requested.

Applicant further requests consideration of references which have come the Applicant's attention as a result of a search reported in the co-pending German application:

DE 43 25 289 discloses a welding-cable connection for manual and automatic arc welding and cutting torch. The welding-cable connection is characterized by a socket/contact-pin connection which rotatably and securely attaches the welding cable in the handle of the manual arc welding and cutting torch or to the machine side of the automatic arc welding and cutting torch. The rotatability is ensured by the arrangement of a spring basket (9) in the contact area (8) of the socket. When the contact pin is connected to the socket, the contact area (1) of the contact pin is clamped in the spring basket (9) and is protected from possible withdrawal by means of a clamping spring (13) which engages in an annular groove (4) on the contact pin. The stop (12) arranged on the socket limits the rotatability of the welding cable in interplay with the guide pin (5) arranged on the contact pin and thereby protects the control lines. No translation of this document is available to applicant at this time.

DE 85 08 745 U1 discloses an electrical contact device for an airbag protection system. The structure is arranged with respect to a steering wheel with a rotational contact and a fixed frame. No translation of this document is available to applicant at this time.

DE 70 11 405 U discloses an electrical appliance rotatable structure provided to avoid multiple turning or bending of the supplied cord. No translation of this document is available to applicant at this time.

EP 1 358 973 has already been made of record in the present application and is discussed above.

Consideration of the references is requested. Further and favorable action on the merits is requested.

Respectfully submitted
for Applicant,



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Attached: Petition for Three Month Extension of Time
PTO/SB/08a form
copies of (4) References

SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

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